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FOR: APPARATUS AND METHOD FOR DESIGNATING REVERSE COMMON CHANNEL FOR DEDICATED COMMUNICATION IN A MOBILE COMMUNICATION SYSTEM

Dated: August 15, 2000

Assistant Commissioner
for Patents
Washington, D.C. 20231

TRANSMITTAL OF PRIORITY DOCUMENTS

Sir:

Enclosed is a certified copy of Korean Appln. No. 99-27911; filed on July 10, 1999; Korean Appln. No. 99-34013 filed on August 17, 1999; and Korean Appln. No. 99-42136 filed on September 30, 1999 and from which priority is claimed under 35 U.S.C. §119.

Respectfully submitted,

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CERTIFICATE OF TRANSLATION

As a below named translator, I hereby declare that my residence and citizenship are as stated below next to my name and I hereby certify that I am conversant with both the English and Korean languages and the document enclosed herewith is a true English translation of the Priority Document with respect to the Korean patent application No. **1999-27911** filed on **July 10, 1999.**

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CITIZENSHIP : REPUBLIC OF KOREA

Translation of Priority Document

THE KOREAN INTELLECTUAL PROPERTY OFFICE

This is to certify that annexed hereto is a true copy from the records of the Korean Intellectual property Office of the following application as filed

Application Number : Korean Patent Application No. 1999-27911

Date of Application : July 10, 1999

Applicant(s) : Samsung Electronics Co., Ltd.

July 26, 2000

COMMISSIONER

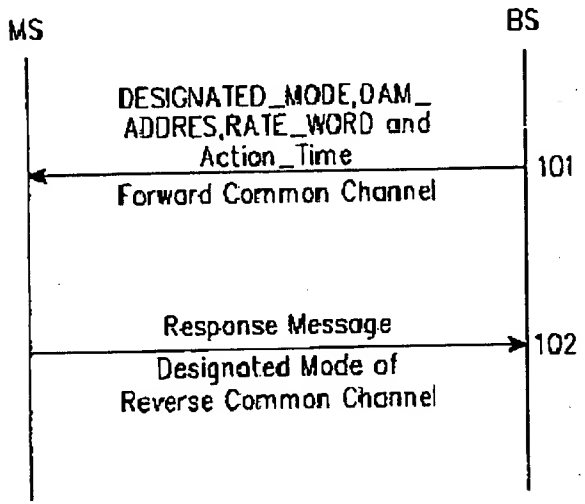
MS
BS
DESIGNATED_MODE,DAM_
ADDRES,RATE_WORD and
Action_Time
Forward Common Channel
101
Response Message
Designated Mode of
Reverse Common Channel
102

FIG.1

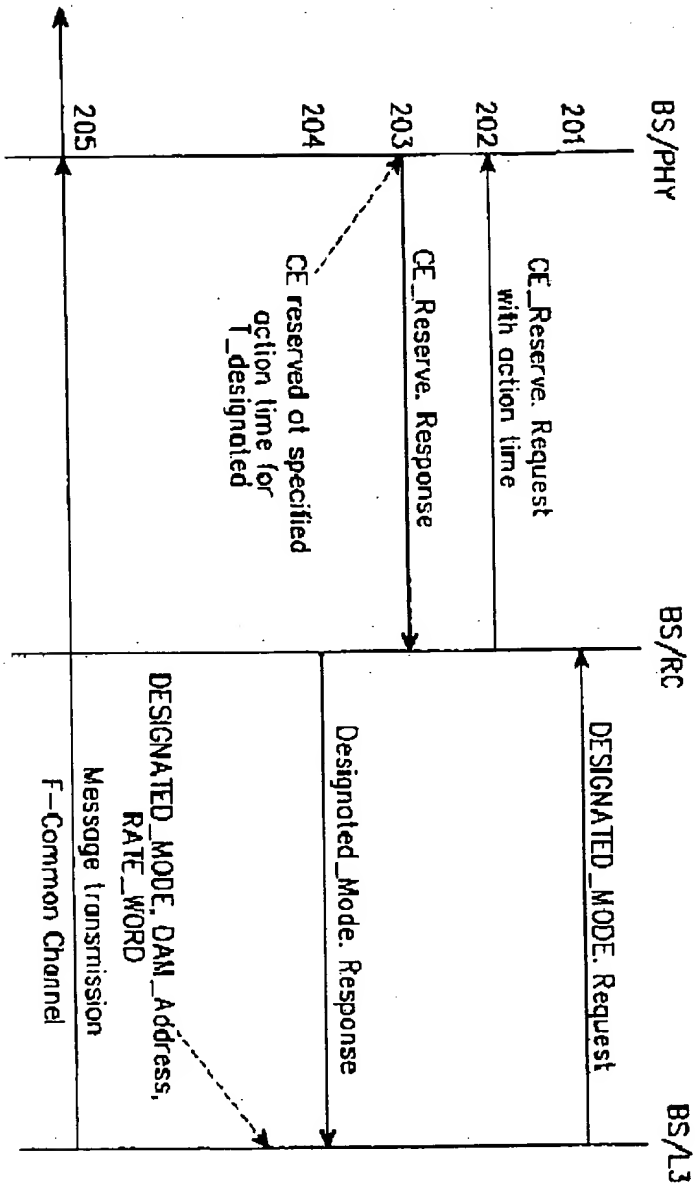
BS/PHY
BS/RC
BS/L3
201
202
203
204
205
CE_Reserve. Request with action time
CE_Reserve. Response
CE reserved at specified action time for T_designated
DESIGNATED_MODE. Request
Designated_Mode. Response
DESIGNATED_MODE, DAM_Address, RATE_WORD
Message transmission
F-Common Channel

FIG.2

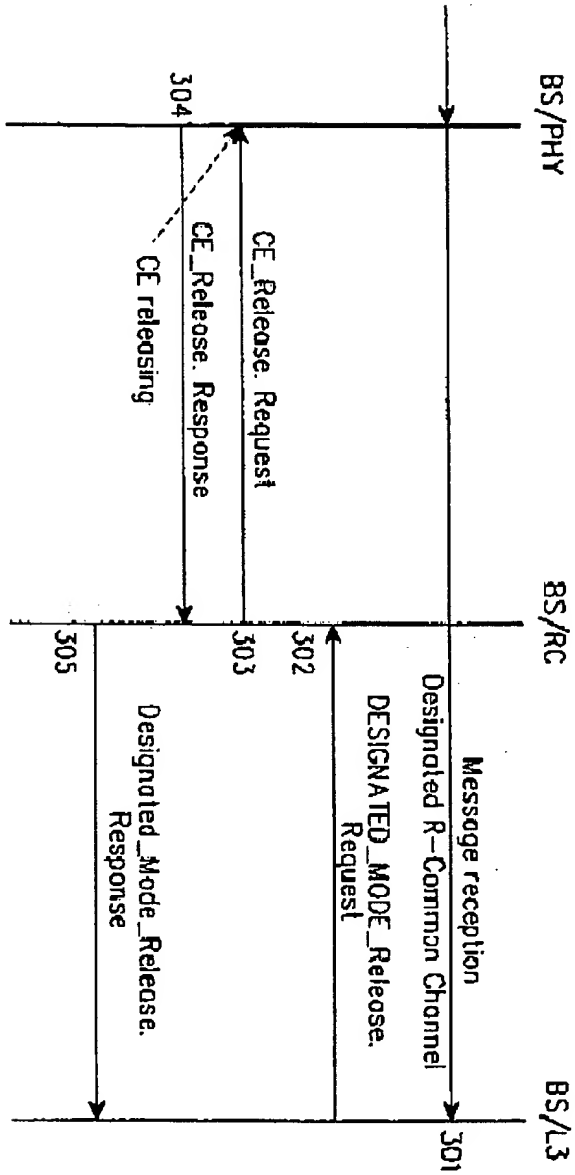
BS/PHY
BS/RC
BS/L3
304
CE releasing
CE_Release. Response
CE_Release. Request
303
302
305
Designated_Mode_Release. Response
DESIGNATED_MODE_Release. Request
Designated R-Common Channel Message reception
301

FIG.3

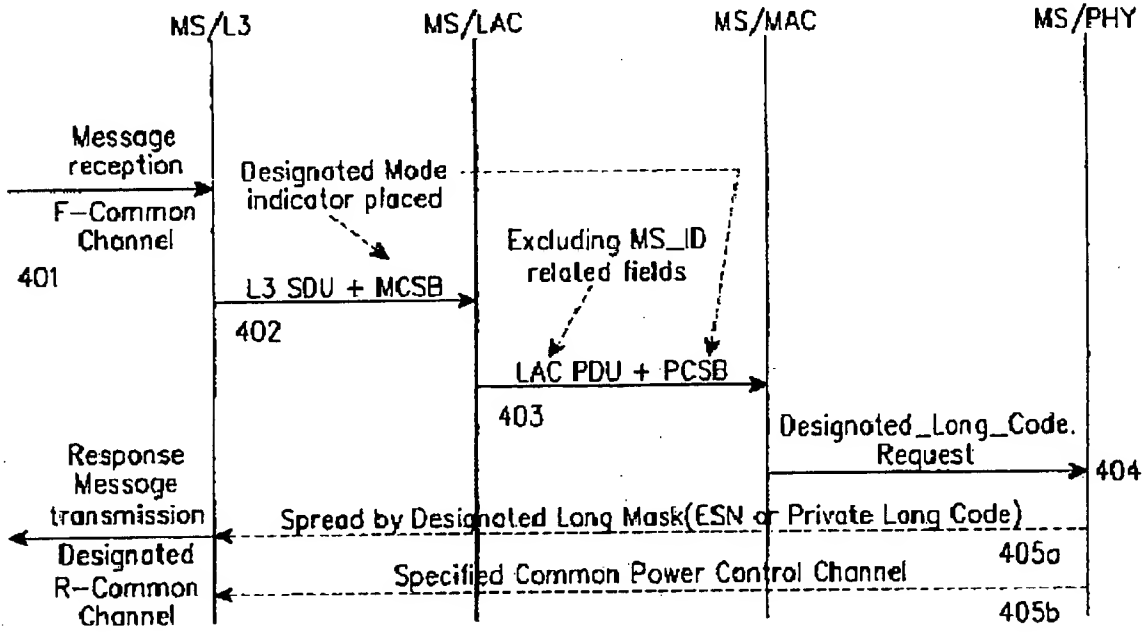
MS/L3
MS/LAC
MS/MAC
MS/PHY
Message reception
F-Common Channel
401
Designated Mode indicator placed
L3 SDU + MCSB
402
Excluding MS_ID related fields
LAC PDU + PCSB
403
Designated_Long_Code. Request
404
Response Messoge transmission
Designated R-Common Channel
Spread by Designated Long Mask(ESN or Private Long Code)
405a
Specified Common Power Control Channel
405b

FIG.4

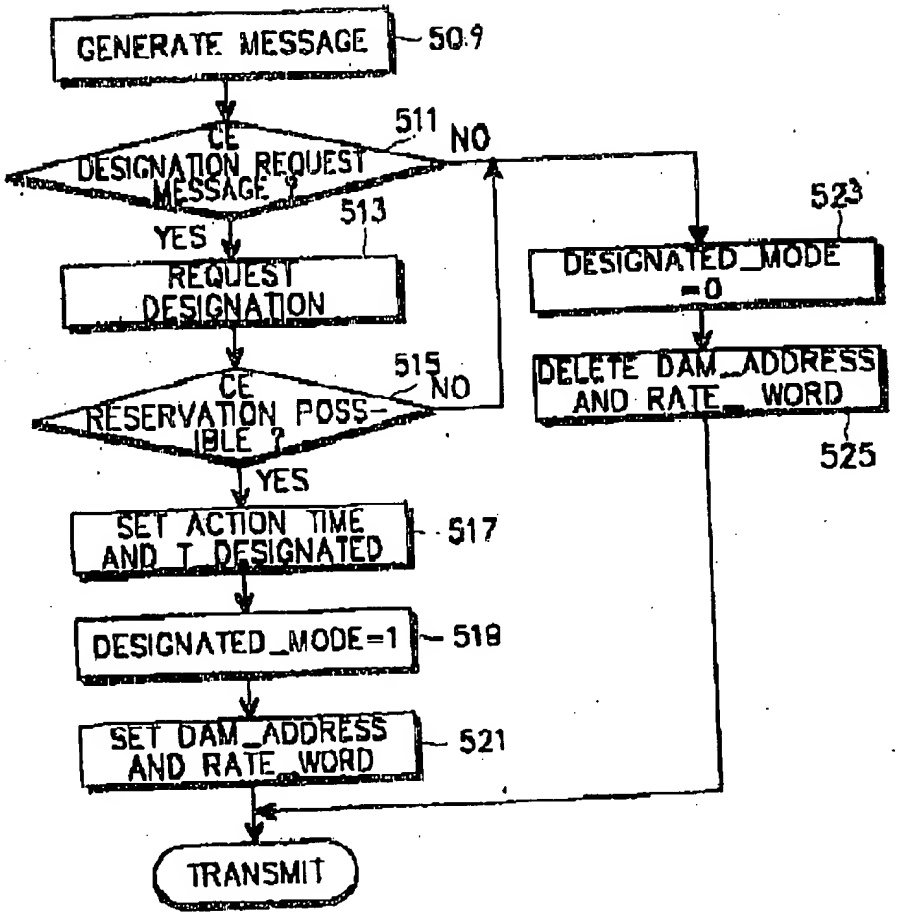
GENERATE MESSAGE
509
CE DESIGNATION REQUEST MESSAGE ?
511
NO
YES
513
REQUEST DESIGNATION
CE RESERVATION POSSIBLE ?
515
NO
YES
SET ACTION TIME AND T_DESIGNATED
517
DESIGNATED_MODE=1
518
SET DAM_ADDRESS AND RATE_WORD
521
TRANSMIT
523
DESIGNATED_MODE =0
DELETE DAM_ADDRESS AND RATE_WORD
525

FIG. 5

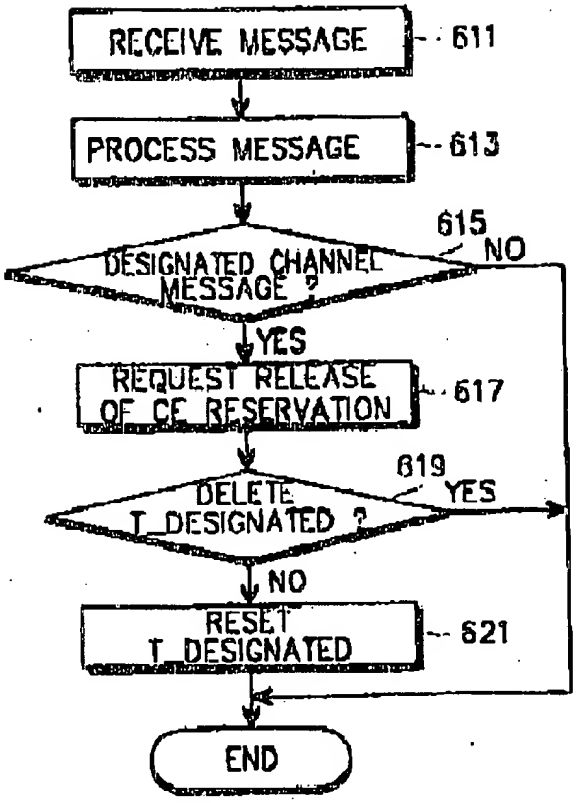
RECEIVE MESSAGE
611
PROCESS MESSAGE
613
615
DESIGNATED CHANNEL MESSAGE ?
NO
YES
REQUEST RELEASE OF CF RESERVATION
617
619
DELETE T_DESIGNATED ?
YES
NO
RESET T_DESIGNATED
621
END

FIG. 6

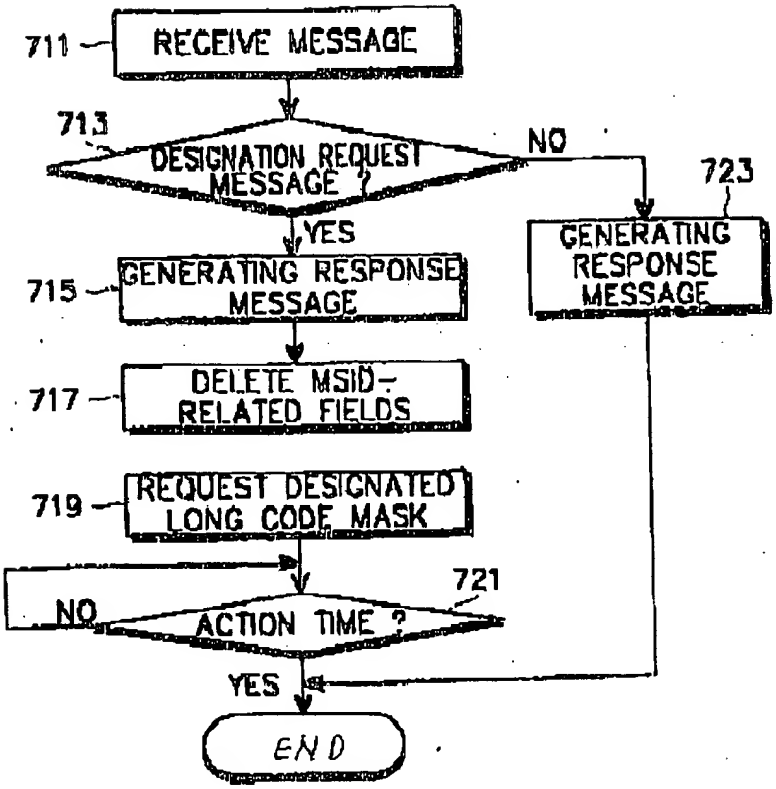
711
RECEIVE MESSAGE
713
DESIGNATION REQUEST MESSAGE ?
NO
YES
723
GENERATING RESPONSE MESSAGE
715
GENERATING RESPONSE MESSAGE
717
DELETE MSID-RELATED FIELDS
719
REQUEST DESIGNATED LONG CODE MASK
721
NO
ACTION TIME ?
YES
END

FIG. 7

[SPECIFICATION]

[TITLE OF THE INVENTION]

APPARATUS AND METHOD FOR DESIGNATING A REVERSE COMMON CHANNEL FOR DEDICATED COMMUNICATION IN A MOBILE COMMUNICATION SYSTEM

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 is a signal flow in a basic procedure of designating a reverse common channel to be dedicated according to the preferred embodiment of the present invention.

FIG. 2 is a signal flow in a BS message transmission procedure for designation of a reverse common channel according to the preferred embodiment of the present invention.

FIG. 3 is a signal flow in a BS message reception procedure for releasing the reverse common channel from a designated mode according to the preferred embodiment of the present invention.

FIG. 4 is a flowchart illustrating a procedure from receipt of a message to transmission of a response message in an MS signaling layer to designate the reverse common channel to be dedicated according to the preferred embodiment of the present invention.

FIG. 5 is a flowchart illustrating the BS message transmission procedure shown in FIG. 2 according to the preferred embodiment of the present invention.

FIG. 6 is a flowchart illustrating the BS message reception procedure shown in FIG. 3 according to the preferred embodiment of the present invention.

FIG. 7 is a flowchart illustrating the response message generating procedure of the MS shown in FIG. 4 according to the preferred embodiment of the present invention.

[DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT]

[OBJECT OF THE INVENTION]

[RELATED FIELD AND PRIOR ART OF THE INVENTION]

The present invention relates generally to a common channel communication apparatus and method in a Code Division Multiple Access (CDMA) communication system, and in particular, to an apparatus and method for designating a common channel for dedicated communication with a specific mobile station.

Conventional CDMA mobile communication systems, which primarily provide voice service, have evolved into IMT-2000 standard systems. In addition to voice service, IMT-2000 systems can provide high quality voice service, moving picture service, and Internet browsing.

Data is communicated on dedicated channels and common channels in a mobile communication system. Dedicated channels and common channels are available on both the forward and reverse links. The common channels are so named because each common channel is commonly shared by a plurality of mobile stations (MSs). If more than one of the MSs attempt a call on a common channel at the same time, contention occurs, impeding reliable communications. The contention problem of common channels is more serious on the reverse link than on the forward link.

On the other hand, no channel contention occurs on a dedicated channel because the dedicated channel is literally dedicated to one-to-one communication between a base station (BS) and an individual mobile station. Therefore, the message transmission success rate is high on the dedicated channel. Due to the low transmission success rate on common channels, an MS will attempt to access a BS repeatedly on a common channel. Consequently, resources are misused and inter-channel interference increases.

In present CDMA mobile communication systems, especially the North America system, there are an R-CCCH (Reverse Common Control Channel) and an R-EACH (Reverse Enhanced Access Channel) for the reverse link, whereas, in a conventional IS-95B communication system, there is only an R-ACH (Reverse Access Channel) for the reverse link. When the MS has to transmit data on the R-ACH, it competes with other MSs for the R-ACH and this competition or contention often leads to access failure. To increase the transmission performance of the reverse channel, methods have been suggested in which common channels are designated to be dedicated. Such methods are disclosed in Korean Application Nos. 1998-14179, 1998-13150, 1998-14274, 1998-14275, 1998-14276, and 1998-14880 filed by the applicant. According to common channel designation methods, when a BS and an MS attempt a call on a common channel, the MS designates a common channel for use in accessing the BS to be dedicated or quasi-dedicated to thereby be immune from the interference of common channel signals from other MSs and thus increase the transmission success rate.

[SUBSTANTIAL MATTER OF THE INVENTION]

It is, therefore, an object of the present invention to provide an apparatus and method for communicating between a BS and an MS on common channels with an increased transmission performance in a CDMA communication system.

It is another object of the present invention to provide an apparatus and method for designating a common channel to be dedicated for one-to-one communication between a BS and a particular MS in a CDMA communication system.

It is another object of the present invention to provide an apparatus and method for designating a reverse common channel to be dedicated as a one-to-one communication link between a BS and an MS in a CDMA communication system, where the BS transmits a control message including spreading code information required for common channel designation and information about a common power control channel to the MS, and the MS spreads user data with the designated spreading code according to the control message.

It is a further object of the present invention to provide a method for constructing messages in a BS signaling layer and interfacing between BS layers in order to designate a reverse common channel to be dedicated for one-to-one communication between a BS and a particular MS in a CDMA communication system.

It is still another object of the present invention to provide a method for constructing a message in a BS signaling layer and interfacing between BS layers in order to release a reverse common channel from a dedicated mode in a CDMA communication system.

It is yet another object of the present invention to provide a method for constructing a message in a BS signaling layer and interfacing between BS layers in order to designate a reverse common channel to be dedicated for a communication between a BS and an MS and release the reverse common channel from the designated mode in a CDMA communication system.

To achieve the above and other objects, there is provided a method of designating a reverse common channel to be dedicated in a BS of a CDMA communication system. The method comprises the steps of: generating dedication information for designating the reverse common channel as a dedicated channel to receive the generated dedication information through a forward common channel, so as for the reverse common channel to be dedicated for one-to-one communication between the BS and a particular MS; and receiving through the dedicated reverse common channel a response message transmitted from the MS.

According to another aspect of the present invention, there is also provided a method of designating a reverse common channel to be dedicated in an MS of a CDMA communication system. The method comprises the steps of: receiving dedication information for the reverse common channel from a BS through a forward common channel; and designating the reverse common channel as a dedicated channel according to the received dedication information and transmitting a response message for a received message to the BS through the dedicated reverse common channel.

[CONSTRUCTION AND OPERATION OF THE INVENTION]

The present invention is intended to provide an apparatus and method for

designating a reverse common channel to be dedicated for one-to-one communication between a BS and an MS in a CDMA communication system, covering the structure of a message generated from a signaling layer (layer 3) of the BS, inter-layer interfacing, the structure of a message generated from the MS in response to a received message, and a communication method between the BS and the MS. Designation of a reverse common channel to be dedicated can be implemented in a LAC (Link Access Control) layer as well as in the signaling layer described in the preferred embodiment of the present invention. When message fields are formed not by the signaling layer but by the LAC layer, the layers may be interfaced in a different manner.

The preferred embodiment of the present invention provides an apparatus and method for designating a reverse common channel to be dedicated and an inter-protocol layer interfacing method. For this purpose, a BS transmits a control message on a forward common channel to an MS. This control message includes long code information representing the spreading code for common channel designation and common power control channel information. The MS responds to the control message with a response message. In this case, the reverse common channel designation relieves the MS of the constraint of competing with other MSs for access to the common channel.

The reverse common channel designation ensures a rapid response time in transmitting a message on a designated reverse common channel, increases the transmission success rate of the reverse common channel, and reduces inter-channel interference caused by message re-transmission. Further, it decreases the number of fields added by an MS LAC layer, thereby reducing errors that occur during message transmission.

Now, the preferred embodiment of the present invention will be described in detail with reference to the attached drawings.

FIG. 1 illustrates the signal flow between the BS and the MS in a common channel designating procedure for the case that the BS requests that the MS designate a common channel to be dedicated and the MS receives a message including parameters necessary for common channel designation from the BS, according to the preferred embodiment of the present invention.

Referring to FIG. 1, the BS transmits dedication information (designated channel indicating parameters) to the MS on a forward common channel in step 101. The dedication information includes a designated channel indicator (DESIGNATED_MODE), the address of a common power control channel (DAM_ADDRESS: Designated Access Mode_ADDRESS), the data rate (Rate_Word), and the action time. Therefore, when the BS is to designate a common channel to be dedicated for communication with a particular MS, it transmits a message with message fields including the above three parameters to the MS on a forward common channel. Then, the MS analyses the message. If the MS confirms that the message includes the designated channel indicating parameters, it designates a reverse common channel to be dedicated according to the parameters and transmits a response message to the BS on the designated reverse common channel in step 102. For designation of the reverse common channel, the MS may use its unique long code mask like an ESN (Electronic Serial Number) mask.

A description will be made of a reverse common channel designating method

in signaling layer L3 of the BS.

Table 1 lists exemplary messages transmitted from the BS to the MS on a forward common channel. Upon receipt of these messages, the MS should transmit response messages for the messages to the BS on a reverse common channel.

(Table 1)

Message Title	
f-csch	r-csch
Status Request Message	Status Request Message or Extended Status Response Message
TMSI Assignment Message	TMSI Assignment Completion Message
General Page Message	Page Response Message
SSD Update Message	Base Station Challenge Order
Authentication Challenge Message	Authentication Challenge Response Message
Base Station Challenge Confirmation Order	SSD Update Confirmation Order or SSD Update Rejection Order
Extended Release Message	Extended Release Response Message
Service Redirection Message	Mobile Station Reject Order

Referring to Table 1, if the BS transmits a status request message to the MS on a forward common signaling channel (f-csch), the MS transmits a status response message to the BS on a reverse common signaling channel (r-csch). When the MS transmits the exemplary messages of Table 1 on a reverse common channel in the conventional mobile communication system, the messages may not reach the BS reliably and thus need to be retransmitted. The retransmission may incur interference with other MSs. However, transmission performance can be increased by designating the reverse common channel to be dedicated and transmitting the messages on the designated reverse common channel according to the preferred embodiment of the present invention.

To designate the reverse common channel, the forward channel messages of Table 1 should include designated-channel-indicating parameters shown in Table 2, according to the preferred embodiment of the present invention.

(Table 2)

L3 SDU in Table 1	L3 SDU length [in bits] in Table 1
DESIGNATED_MODE	1
DAM_ADDRESS	0 or 6
RATE_WORD	0 or 3

The designated channel indicating parameter fields include three types of parameters shown in Table 2. In Table 2, DESIGNATED_MODE is a field that orders the MS to designate a common channel to be dedicated, the field DAM_ADDRESS represents the address of a common power control channel, i.e., the index of the common power control channel that is referred to for control of the transmission power of a message to be transmitted after common channel designation, and the field RATE_WORD indicates the transmission rate of a designated reverse common channel. The LAC layer adds a field Action_Time to notify the MS of the time to transmit a response message after the MS receives an exemplary message as shown in Table 1. The BS adds the two fields when it transmits a particular message or requests the MS to transmit a response message on the designated common channel.

For designation of the common channel to be dedicated, the corresponding MS should use a predetermined long code in spreading the reverse common channel and the BS should reserve a channel element to receive the reverse channel signal spread

with the spreading code.

FIG. 2 is the signal flow in a procedure for adding information about the reverse common channel designation in the BS signaling layer, according to the preferred embodiment of the present invention.

Referring to FIG. 2, layer 3 (L3) of the BS requests reservation of a channel element before designation of the common channel in step 201, as stated above. That is, the BS L3 requests a designated mode to be set to designate the reverse common channel to be dedicated if the BS is to transmit a message that requires a response message from the MS. The designated mode can be set to designate the reverse common channel even when the BS is to transmit a message that acknowledges designation among response-requiring messages. Here, the f-csch messages listed in Table 1 require response messages from the MS. When a response message should be received on a designated reverse common channel, the BS L3 outputs a mode signal (Designated_Mode) requesting reservation of channel resources.

Upon receipt of the channel element reservation request from the BS L3, the resource controller (RC) of the BS transmits a channel element reservation request signal including reservation action time (CE_Reserve. Request with Action Time) to the physical layer (PHY) of the BS, in step 202.

Action Time is set to an appropriate value considering the time until the BS receives a response message from the MS after the MS receives a forward common channel message from the BS. Action Time is added in a LAC layer of the BS. The LAC layer adds one bit for USE_TIME and 6 bits for ACTION_TIME to set Action

Time. The duration (T_designated) of the channel element reserved state is also set to prevent continuous occupation of the channel element and misuse of resources in case the BS fails to receive the response message within a predetermined time. The reservation duration can be set in consideration of time required for transmission of the forward common channel message, time required to process the forward common channel message in the MS, and time taken for other related operations.

The reservation duration, set in step 203 of FIG. 2, is necessary in case that the MS does not recognize the forward common channel message transmitted from the BS and thus cannot transmit a response message to the BS. Thus, the channel element starts to operate at the action time and the channel reserved state lasts for a time period set in a reservation timer (T_designated). Unless the BS fails to receive a required response message until the reservation timer expires, it automatically releases the channel element from the reserved state in order to prevent the dissipation of resources caused by the continuous reservation of the channel element. Thus, the timer should be set to an appropriate value.

In step 203, the PHY notifies the RC of information about channel element reservation. If it is not possible to reserve the channel element, the PHY generates a signal indicating "reservation unavailable" and the timer value is not set. If the channel element has been reserved, the PHY generates a reservation complete signal.

In step 304, the RC transmits a response received from the PHY to the L3 (Designated_Mode Response). The BS transmits the thus-constituted message to the MS on the forward common channel in step 205.

If the L3 receives a signal indicating "reservation unavailable", it sets DESIGNATED_MODE to 0 and omits the fields DAM_ADDRESS and RATE_WORD. In this case, the LAC layer does not add USE_TIME and ACTION_TIME either. This implies that the corresponding reverse common channel assumes the same characteristics as a conventional reverse channel. On the other hand, if the L3 receives a reservation acknowledgment signal, the L3 sets DESIGNATED_MODE to 1, writes the address of a common power control channel for reference in the field DAM_ADDRESS, and writes information about the data rate of a designated channel in the field RATE_WORD. The LAC layer adds the field USE_TIME and ACTION_TIME.

FIG. 5 is a flowchart illustrating the reverse common channel designation procedure of FIG. 2 in the BS.

Referring to FIG. 5, if a forward common channel message is generated in step 509, the BS checks whether the message is used for reverse common channel designation in step 511. If the message is a designation request message, the BS checks whether there is an available channel to be reserved in step 513. If channel reservation is possible, the BS reserves the channel and sets Action Time and T_designated in step 517. Action Time indicates a time point when the BS transmits the forward common channel message and T_designated is a time period for which the BS awaits receipt of a response message from the MS on a reverse common control channel. Then, the BS generates the designated channel indicating parameters shown in Table 2 in steps 519 and 521. The parameters include DESIGNATED_MODE, DAM_ADDRESS, and RATE_WORD. To designate the reverse common channel, the BS sets DESIGNATED_MODE to 1 for designating the reverse common control

channel at step 519, and the other parameters for setting the transmission power and transmission rate of the reverse common control channel to corresponding values in step 521. Then, the three parameters are added to one of the messages listed in Table 1 and transmitted at the designated action time on the forward common control channel.

If the generated message is not a designation request message in step 511 or there is no channel element to be reserved in step 515, the BS sets DESIGNATED_MODE to 0 in step 523, deletes the other parameter fields in step 525, and transmits the message on the forward common channel.

After transmitting the message (requiring a response from the MS) on the forward common channel, the BS awaits receipt of the response message from the MS for the time T_designated.

FIG. 7 is a flowchart illustrating the reverse common control channel message transmitting procedure of FIG. 4 in the MS.

Referring to FIG. 7, upon receipt of the message on the forward common control channel in step 711, the MS checks whether the received message includes the designated channel indicating parameters in step 713. If it does, the MS constructs a response message for the received message in step 715 and deletes MS ID-related fields in step 717. The MS ID-related fields are MSID_TYPE, MSID_LEN, and MSID in Table 3. The MS requests a designated long code mask and generates a spreading code for the reverse common control channel to be designated in step 719. The designated long code mask can be an ESN long code mask, a public long code mask, or a dedicated long code mask promised between the BS and the MS. The MS

transmits the response message on the designated reverse common control channel at an action time in step 721. Unless the received message includes the designated channel indicating parameters in step 713, the MS generates a spreading code for the reverse common control channel using a contention-based common channel long code and transmits the response message on the reverse common channel.

After receiving the response message, the BS releases the reverse common control channel from the designated mode in the procedure shown in FIG. 3. FIG. 6 is a flowchart illustrating the procedure shown in FIG. 3.

Referring to FIG. 6, upon receipt of the response message from the MS in step 611, the BS processes the received message in step 613. In step 615, the BS checks whether the message has been transmitted on the designated reverse common control channel. In the case of the designated reverse common control channel, the BS releases the reserved channel element in step 617 and stops the timer T_designated in steps 619 and 621.

If the BS fails to receive the response message from the MS within T_designated while the designated reverse common control channel is in use, the BS recovers resources by releasing the reserved channel element and stops the reservation time (T_designated) in order to assign the reverse designated common channel to another MS.

The BS transmits the thus-constituted message to the MS on the forward common channel in step 305. The DESIGNATED_MODE is set to 1 in the message as an indicator that orders the MS to spread the reverse common channel with a

particular long code like the ESN of the MS.

FIG. 3 is the signal flow within the BS when the BS receives the response message for the transmitted forward common channel message including information about the reverse common channel from the MS on the designated reverse common channel, according the preferred embodiment of the present invention.

Referring to FIG. 3, the L3 of the BS receives the response message from the MS on the designated reverse common channel in step 301. If the reverse common channel has not been designated, the BS has, in effect, received the message on a conventional access channel.

In step 302, the L3 notifies the RC that the designated duration of the reverse common channel expires when the L3 receives the response message for the autonomously generated message that requires a response.

In step 303, the RC notifies the PHY that the reverse common channel should be released from the designated mode. Then, the PHY demodulates the designated reverse common channel spread with a unique MS long code, (e.g., an ESN) and releases the reservation of the channel element

In step 304, the PHY notifies the RC that the reservation of the channel element has been released. Then, the RC notifies the L3 of the release of the channel element from the reserved state, thereby wholly releasing the reverse common channel from the designated mode, in step 405.

As described above, for a communication between a BS and a specific MS on a designated reverse common channel, a channel element is reserved and the reservation duration of the channel element is set. If the reserved channel element is available, the BS transmits dedication information (designated channel indicating parameters) to the MS on a forward common channel at a designated action time. The dedication information is added to one of the forward common channel messages shown in Table 1 that require response messages on a reverse common channel and includes the designated channel indicating parameters of DESIGNATED_MODE, DAM_ADDRESS, and RATE_WORD as shown in Table 2. DESIGNATED_MODE may be one bit. If this field is set, a spreading code that designates the reverse common channel is generated. Here, the BS and the MS control a preset dedicated long code to be generated for the reverse common channel. The spreading code can be a long code generated using the ESN mask of the MS, a public long code mask, or a predetermined long code for common channel designation.

Table 3 shown below lists message fields added by a LAC layer of the MS when the MS transmits the response message on the designated reverse common channel. That is, the messages shown in Table 3 are LAC layer messages transmitted from the MS after reverse common channel designation.

(Table 3)

Field	Basic Mode	Designated Mode	Length [bit]
MSG_TYPE	M	M	8
ACK_SEQ	M	M	3
MSG_SEQ	M	M	3
ACK_REQ	M	M	1
VALID_ACK	M	M	1

ACK_TYPE	M	M	3
MSID_TYPE	M	O	3
MSID_LEN	M	O	4
MSID	M	O	8 × MSID_LEN

In Table 3, the LAC layer adds the fields listed under Basic Mode when the MS is to transmit the response message on the reverse common channel. Because the common channel is commonly shared by a plurality of MSs, the MS should transmit its address to the BS so that the BS can identify the MS. Therefore, MSID_TYPE, MSID_LEN, and MSID are of necessity added. However, if the reverse common channel is designated to be dedicated to the specific MS, the fields MSID_TYPE, MSID_LEN, and MSID that identify the MS are not necessary, as shown in the list under the Designated Mode column in Table 3. The resulting decrease in the number of fields added by the LAC layer reduces transmission errors.

MSG_TYPE provides transmission characteristics of the message. ACK_SEQ is the sequence number of the response. The BS confirms message receipt by checking the stored sequence of its transmitted message and the sequence of a received message. MSG_SEQ indicates the sequence of a transmitted message. ACK_REQ is a command requesting a response for the current message. If this field is set to 1, the BS or the MS that receives the message should transmit a response message. VALID_ACK indicates the validity of an acknowledgment and ACK_TYPE indicates termination of the acknowledgment.

As noted from Table 3, designation of a reverse common channel increases a transmission success rate and reduces inter-channel interference. Furthermore, the length of an MS-initiated message is decreased, thereby reducing message

transmission errors.

FIG. 4 is a signal flow in a response message transmission procedure in the MS after it designates a reverse common channel.

Referring to FIG. 4, the MS receives a message from the BS on the forward common channel in step 401.

Then, the L3 recognizes the reverse common channel information included in an L3 SDU, generates a response message for the received message, and transmits the response message to the LAC layer in step 402. Here, the L3 places a designated mode indicator requesting transmission of the response message on the designated reverse common channel in an MCSB.

The LAC layer recognizes that the response message is to be transmitted on the designated reverse common channel from an analysis of the MSCB received together with the L3 SDU, does not add MS ID-related fields shown in Table 3, and transmits an LAC PDU (Protocol Data Unit) and PCSB (PDU Control Status Block) to a MAC (Medium Access Control) layer in step 303. The LAC PDU excludes the MS ID-related fields and the PCSB includes the designated mode indicator.

The MAC layer transmits a signal commanding the response message to be spread with a unique long code to the PHY in step 604.

The PHY generates a spreading code using an ESN mask or a private long code mask for designation of the reverse common channel and transmits the response

message on the designated reverse common channel according to the command received from the MAC layer, in step 405a. Here, the MS refers to a common power control channel in transmitting the response message to the BS in step 405b. The ID of the common power control channel can be detected from DAM_ADDRESS and the transmission rate of the reverse common channel is set according to RATE_WORD in the message received from the BS.

Consequently, the designated reverse common channel serves similarly as a dedicated channel.

[EFFECTS OF THE INVENTION]

As described above, in accordance with the present invention, for designation of a reverse common channel, a BS transmits a control message including long code information indicating a spreading code, channel transmission rate, and information about a common power control channel to an MS. The MS spreads user data with a unique long code for the reverse common channel and transmits a response message for the control message on the designated reverse common channel. The designation of the reverse common channel to be dedicated ensures a rapid response time, increases a transmission success rate, and reduces interference between channels caused by message retransmission. Furthermore, an MS LAC layer adds a lesser number of fields, resulting in the decrease of transmission errors.

[PATENT CLAIMS]

1. A device for designating a reverse common channel to be dedicated in a base station of a CDMA (Code Division Multiple Access) communication system, the device comprising:

a transmitter for generating dedication information for designating the reverse common channel as a dedicated channel to transmit the generated dedication information through a forward common channel, so as to dedicate the reverse common channel for one-to-one communication between the base station and a particular mobile station; and

a receiver for designating the reverse common channel as a dedicated channel according to the generated dedication information and receiving a response message transmitted from the mobile station through the designated reverse common channel.

2. The device as claimed in claim 1, wherein the dedication information includes a designated channel indicator for designating the reverse common channel as a dedicated channel.

3. The device as claimed in claim 2, wherein the designated channel indicator is an identifier for the mobile station to order an ESN (Electronic Serial Number) mask to be used using a spreading code.

4. The device as claimed in claim 1, wherein the dedication information includes a designated channel indicator for designating the reverse common channel as a dedicated channel, an address of a common power control channel for controlling transmission power of the designated reverse common channel, transmission rate, and

action time.

5. The device as claimed in claim 4, wherein the dedication information is included into a message of the forward common channel, to which the mobile station must respond through the reverse common channel.

6. A device for designating a reverse common channel to be dedicated in a mobile station of a CDMA (Code Division Multiple Access) communication system, the device comprising:

a forward common channel receiver for receiving dedication information for designating the reverse common channel as a dedicated channel so as to dedicate the reverse common channel for one-to-one communication between a base station and the mobile station; and

a reverse common channel transmitter, which is set by a spreading code according to the received dedication information, for spreading a message received through the forward common channel with the spreading code to transmit the spread message.

7. The device as claimed in claim 6, wherein the received dedication information includes a designated channel indicator for designating the reverse common channel as a dedicated channel, an address of a common power control channel for controlling transmission power of the designated reverse common channel, transmission rate, and action time.

8. The device as claimed in claim 7, wherein the dedication information is included into a message of the forward common channel, to which the mobile station

must respond through the reverse common channel.

9. A method for designating a reverse common channel to be dedicated in a base station of a CDMA (Code Division Multiple Access) communication system, the method comprising the steps of:

generating dedication information for designating the reverse common channel as a dedicated channel to transmit the generated dedication information through a forward common channel, so as to dedicate the reverse common channel for one-to-one communication between the base station and a particular mobile station; and

designating the reverse common channel as a dedicated channel according to the generated dedication information and receiving a response message transmitted from the mobile station through the designated reverse common channel.

10. The method as claimed in claim 9, the dedication information includes a designated channel indicator for designating the reverse common channel as a dedicated channel, an address of a common power control channel for controlling transmission power of the designated reverse common channel, transmission rate, and action time.

11. The method as claimed in claim 10, wherein the dedication information is included into a message of the forward common channel, to which the mobile station must respond through the reverse common channel.

12. A method for designating a reverse common channel to be dedicated in a mobile station of a CDMA (Code Division Multiple Access) communication system, the method comprising the steps of:

receiving dedication information of the reverse common channel from a base station through a forward common channel; and

designating the reverse common channel as a dedicated channel according to the received dedication information and transmitting a response message responsive to a received message through the designated reverse common channel.

13. The method as claimed in claim 12, wherein the received dedication information includes a designated channel indicator for designating the reverse common channel as a dedicated channel, an address of a common power control channel for controlling transmission power of the designated reverse common channel, transmission rate, and action time.

14. The method as claimed in claim 13, wherein the dedication information is included into a message of the forward common channel, to which the mobile station must respond through the reverse common channel.

15. A method for designating a reverse common channel to be dedicated in a base station of a CDMA (Code Division Multiple Access) communication system, the method comprising the steps of:

setting action time and reservation time and adding dedication information for designating the reverse common channel as a dedicated channel into a message requiring a response of a mobile station to transmit the message including the information through a forward common channel, when a dedication-required message is generated;

releasing the designated reverse common channel upon reception of a response message of the mobile station through the designated reverse common channel; and

releasing the designated reverse common channel when the response message is not received within the set reservation time.

16. The method as claimed in claim 15, the dedication information includes a designated channel indicator, an address of a common power control channel for controlling transmission power of the designated reverse common channel, and transmission rate.

17. A method for transmitting a reverse common channel message in a mobile station of a CDMA (Code Division Multiple Access) communication system, the method comprising the steps of:

generating a response message from which fields related to an identifier of a corresponding mobile station are deleted, upon reception of a message including dedication information for designating the reverse common channel as a dedicated channel;

generating a spreading code using a long code mask designated according to the dedication information; and

spreading the generated response message with the spreading code to transmit the spread response message through the reverse common channel within predetermined time.

18. The method as claimed in claim 17, wherein the mobile station identifier fields deleted from the response message are MSID_TYPE, MSID_LEN, and MSID.

[ABSTRACT OF THE DISCLOSURE]

[ABSTRACT]

The present invention provides an apparatus and method for designating a reverse common channel to be dedicated between a base station and a mobile station, and an inter-protocol layer interfacing method. For this purpose, the base station transmits a control message to the mobile station through a forward common channel. This control message includes long code information representing a spreading code for common channel designation and information about a common power control channel. The mobile station generates a response message in response to the control message transmitted from the base station and transmits user data to the base station by spreading the user data with the spreading code. The mobile station transmits the response message to the base station using the designated spreading code and the common power control channel included in the control message transmitted through the forward common channel.

[REPRESENTATIVE FIGURE]

FIG. 1

[INDEX]

DESIGNATION, REVERSE COMMON CONTROL CHANNEL, COMMON POWER CONTROL CHANNEL, DESIGNATION LONG CODE